

Thalassia Sal. 40 (2018), 9-16
ISSN 0563-3745, e-ISSN 1591-0725

DOI 10.1285/i15910725v40p9
<http://siba-ese.unisalento.it> - © 2018 Università del Salento

MOHAMED MOURAD BEN AMOR¹,
KHADIJA OUNIFI-BEN AMOR¹, CHRISTIAN CAPAPÉ²

¹ Institut National des Sciences et Technologies de la Mer,
port de pêche, 2025 La Goulette, Tunisia.
Université de Tunis El Manar, Faculté des Sciences de Tunis,
Laboratoire de Biodiversité, Biotechnologie et Changement Climatique,
LR11ES09, 1002, Tunis, Tunisia

² Laboratoire d'Ichtyologie, Université de Montpellier,
case 104, 34095 Montpellier cedex 5, France
email: capape@univ-montp2.fr

RECORD OF A CRITICALLY ENDANGERED SKATE, *LEUCORAJA MELITENSIS* (CHONDRICHTHYES: RAJIDAE) FROM TUNISIAN COAST (CENTRAL MEDITERRANEAN)

SUMMARY

The authors report the capture of a specimen of the Maltese skate *Leucoraja melitensis* (Clark, 1926) from the northern coast of Tunisia. The specimen was a juvenile female having 270 mm in total length, 136 mm in disc width, and weighing 80.2 g. The species was previously common in the area, but at present it is becoming very rare indicating a drastic decline as in the other Mediterranean areas where it was found. Such parameter explained why *L. melitensis* is considered as species critically endangered.

INTRODUCTION

Maltese skate *Leucoraja melitensis* (Clark, 1926), previously known as *Raja melitensis* was furtherly included in the genus *Leucoraja* following McEachran and Dunn (1998). *L. melitensis* is one of the rare skate species endemic to the Mediterranean, known off Algeria, Tunisia, Malta and Italy, its range being rather restricted to Sicilian Channel (Relini *et al.*, 2010; Dulvy and Walls, 2015).

Investigations recently made in the Aegean Sea allowed to collect some specimens (Damas and Vassilopoulou, 2011), and Ferretti *et al.* (2013) noted that a single specimen was recorded during bottom trawl survey occurring in 2005.

A specimen of *Leucoraja melitensis* was captured during the scientific

expedition of “Mohamed Amine” vessel, organized by the Institut des Sciences et Technologies de la Mer of Salammbô (Tunisia). It is described in the present paper and some comments are given about the species distribution in the local area and the Mediterranean Sea.

MATERIAL AND METHODS

The capture of the present *Leucoraja melitensis* occurred on 11 August 2017, with shrimp trawl at 185 m depth, on soft bottom, at the locality 37°35' 18" N and 09°15' 38" E (Fig. 1), together with other teleost, elasmobranch, cephalopod, crustacean and gastropod species. Soon after being landed, the fresh specimen was measured, on board, for total length (TL), disc width (DW) and all morphometric characters to the nearest mm and weighed to the nearest dg. It was delivered at the laboratory to carry out other morphometric measurements and meristic counts which are summarized in Table 1. Meristic counts were recorded following MNASRI *et al.* (2009). The specimen was fixed in 10 % buffered formaldehyde and preserved in 75% ethanol, and deposited in the Ichthyological Collection of the Institut des Sciences et Technologies de la Mer of Salammbô (Tunisia), receiving the catalogue number INSTM Leu-mel 01, and described in the present paper (Fig. 2).

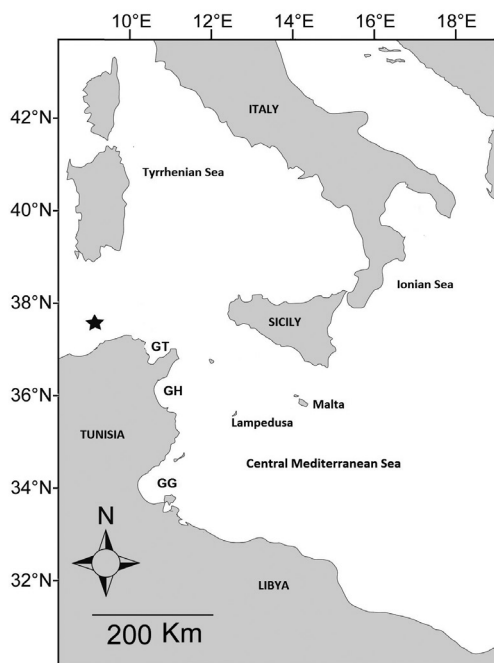


Fig. 1. Map of the central Mediterranean Sea indicating the capture site of *Leucoraja melitensis* off the N Tunisian coast.

Reference	INSTM Leu-mel 01	
Morphometric measurements	in mm	%DW
Total length	270	198.5
Disc length	112	82.4
Disc width	136	100.0
Eye ball length	11	1.3
Cornea	8	5.8
Pre-orbital length	32	23.5
Inter-orbital width	20	14.7
Spiracle length	5	3.7
Spiracle width	7	5.1
Inter-nasal width	19	14.0
Interspiracular width	17	12.5
Mouth width	21	15.4
First gill slit	13	9.6
Fifth gill slit	18	13.2
Space between first gill slit	38	27.9
Space between fifth gill slit	24	17.6
Snout tip to eye	28	27.9
Snout tip to mouth	37	27.2
Snout tip to first gill slit	55	40.4
Snout tip to fifth gill slit	70	51.4
Snout tip to pelvic fin	140	102.9
Snout tip to vent	152	111.8
Pectoral fin anterior margin	73	53.7
Pectoral fin posterior margin	66	48.5
Pectoral fin inner margin	45	33.1
Pelvic fin anterior margin	25	18.4
Pelvic fin posterior margin	31	22.8
Pelvic fin inner margin	20	14.7
Tail length	134	98.5
Snout tip to first dorsal	231	169.9
Snout tip to second dorsal	249	183.1
First dorsal anterior edge	12	8.8
First dorsal posterior edge	11	8.1
First dorsal base	16	11.8
Second dorsal anterior edge	14	10.3
Second dorsal posterior edge	12	8.8
Second dorsal base	17	12.5
Interdorsal space	5	3.7
Meristic counts		
Tooth rows	56/52 [51- 59/51-56]	
Trunchal vertebrae	27 [27-32]	
Pectoral rays	76 [75-80]	
Pseudo-branchial lamellae	13 [13-15]	
Nictitating lamellae	13 [13-15)	
51-59 and 51-56 jaws		

Table 1. Morphometric measurements (in mm) with percentages of disc width (% DW), meristic counts, recorded in *Leucoraja melitensis* collected off the N Tunisian coast. (ref. INSTM Leu-mel 01). Meristic counts placed into brackets are those previously recorded by CAPAPÉ (1975) from other specimens of *L. melitensis* for comparison.

RESULTS AND DISCUSSION

The *Leucoraja melitensis* measured 270 mm TL, 136 mm DW and weighed 80.2 g. It was a juvenile specimen following CAPAPÉ (1977) who noted that size at first sexual maturity occurred between 180 and 220 mm in females from the Tunisian coast (Fig. 2). The specimen was identified with the following



Fig. 2. *Leucoraja melitensis* collected off the N Tunisian coast. (ref. INSTM Leu-mel 01), scale bar = 50 mm.



Fig. 3. Tail of *Leucoraja melitensis* collected off the N Tunisian coast. (ref. INSTM Leu-mel 01), with arrow indicating the lack of caudal fin, replaced by a stump like structure, scale bar = 20 mm.

combination of characters: disc rounded especially posterior margins, anterior margins very slightly sinuous opposite to spiracles and at level of eyes; snout short and blunt, tip prominent and rounded; mouth arched. Pre-orbital length 23.4%, inter-orbital width 14.7%, all in disc width; total length 1.98 times, disc length 0.82 times, tail length 0.98 times all in disc width.

Dorsal surface almost covered with prickles except on the centre of the disc, pelvic fins rather smooth, snout and tail with dense prickles; ventral surface smooth except for snout, disc margins and tail. Thorns with striated bases and hooked cusps, two in front and four around inner margin of each eye, one on each shoulder, 8 along nape, a median serie discontinuous from central area of body to tail birth basis. Tail slender with a median groove in its anterior part, flanked by a parallel row of thorn on each side, no groove on the hind part of the tail with three rows of thorns on tail, a median row, and two lateral rows, one on each side, no thorns between the two dorsal fins, but abnormal lack of caudal fin, replaced by a stump-like structure rounded at its distal end. Dorsal surface ochre to greyish-brown, with, on each pectoral fin, a large eye spot darkish and vermiculated, and three fainter dusky blotches. Aloncle's line is continuous, similar to this previously described by CAPAPÈ (1975) showing a wing rather rounded in its distal end, a curve strongly arched and a point elongated and narrower than the wing.

General shape, morphometric measurements, meristic counts and coloration recorded in the present specimen are in total agreement with CLARK

(1926), CAPAPÉ (1975), STEHMANN and BÜRKE (1984), SERENA (2005), SERENA *et al.* (2010) and LAST *et al.* (2016). With special regard to tooth rows, 56 and 52 rows were found for upper and lower jaws, respectively. CLARK (1926), DIEUZEIDE *et al.* (1953) and TORTONESE (1956) recorded 56-58 rows for the upper jaw, while TORCHIO (1961) found 58 rows and 52 rows for the upper and the lower jaws, respectively. CAPAPÉ (1975) recorded 51-59 and 51-56 jaws the upper and the lower jaws, respectively, with larger ranges because the sample included more specimens different in sizes.

No healed scar was observed at the end of the tail, therefore, the lack of caudal fin in the present specimen was not due to an injury, occurring during an inter or intraspecific fight in the wild (ORLOV, 2010; CAPAPÉ *et al.*, 2015a, b). It could be also the consequence of a failure during embryonic development, having a genetic origin or under the control of pollutant parameters (RIBEIRO-PRADO *et al.*, 2008). Similar patterns were already reported by in other skates species from the Mediterranean Sea (MNASRI *et al.*, 2010; CAPAPÉ *et al.*, 2015a, b). Therefore, this recent capture of a single specimen *Leucoraja undulata* indicates the rarity of the species in the area where it was formerly rather common. For instance, 674 specimens caught from the northern Tunisian coast, between 1970 and 1975, constituted the support of a study of the reproductive biology of the species. Furtherly, investigations conducted by MNASRI (2008) in the same area allow to collect only 7 specimens. *L. melitensis* is extremely rare in S Tunisian areas such as the Gulf of Gabès, probably because the local fishing fleets operated outside its area of occurrence (ENNAJAR, 2002).

The drastic decline *Leucoraja melitensis* concerns not only the Tunisian coast but all regions where it was previously reported (DULVY and WALLS, 2015). Only some specimens were recently found by PORCU *et al.* (2017) at the Sentinelle Bank S to Sardinia. ALDEBERT (1997) noted that the species was not no more found from the Mediterranean coast of France; DAMALAS and VASSILOPOULOU (2011) recorded rare specimens in the Aegean Sea, and according to FERRETTI *et al.* (2013), the last specimen was found from the Adriatic Sea in 2005. However, the occurrence of *L. melitensis* in these three last areas remains questionable, the core of the species being the central Mediterranean Sea, and following CAPAPÉ *et al.* (2006), confusions with its close relative species, Cuckoo skate *Leucoraja naevus* (MÜLLER and HENLE, 1841) cannot be totally ruled out. The present specimen is probably the last *L. melitensis* recorded to date and the occurrence of a viable populations in the Mediterranean remains questionable, and it deserves to be considered as a species critically endangered A2bcd+3bcd what this means? following DULVY and WALLS (2015).

ACKNOWLEDGEMENTS

The authors wish to thank the owner of the vessel “Mohamed Amine”, Mr Mohamed Settey, who kindly provided the specimen of *Leucoraja melitensis* and authorized the publication of the present note.

REFERENCES

- ALDEBERT Y., 1997 - Demersal resources of the Gulf of Lions (NW Mediterranean). Impact of exploitation of fish diversity. *Vie et Milieu*, **47** (4): 275-284.
- CAPAPÉ C., 1975 - Note sur la présence en Tunisie de *Raja naevus* Müller et Henlé, 1841 et *R. melitensis* Clark, 1926: description, premières observations biologiques. *Bulletin de l'Institut national scientifique et technique d'Océanographie et de Pêche, Salammbô*, **4** (1): 75-96.
- CAPAPÉ C., 1977 - Contribution à la biologie des Rajidæ des côtes tunisiennes. VII. *Raja melitensis* Clark, 1926: sexualité, reproduction, fécondité. *Cahiers de Biologie Marine*, **18** (2): 177-190.
- CAPAPÉ C., GUÉLORGET O., VERGNE Y., MARQUÉS A., QUIGNARD J.-P., 2006 - Skates and rays (Chondrichthyes) from waters off the Languedocian coast (southern France, northern Mediterranean). *Annales, Series Historia Naturalis*, **16** (2): 166-178.
- CAPAPÉ C., ALI M., SAAD A., REYNAUD C., 2015a - Tail abnormalities in thornback ray *Raja clavata* (Chondrichthyes: Rajidae) from the coast of Syria (eastern Mediterranean). *Cahiers de Biologie Marine*, **56** (2): 155-161.
- CAPAPÉ C., ALI M., SAAD A., ALKUSAIRY H., REYNAUD C., - 2015b - Atypical characteristics in the longnosed skate *Dipturus oxyrinchus* (Linnaeus, 1785) from the coast of Syria (eastern Mediterranean). *Thalassia Salentina*, **37**: 71-80.
- CLARK R. S., 1926 - Rays and skates. A revision of the European species. *Fisheries, Scotland, Scientific Investigations*, **1**: 1-66.
- DAMALAS D., VASSILOPOULOU V., 2011 - Chondrichthyan by-catch and discards in the demersal trawl fishery of the central Aegean Sea (Eastern Mediterranean). *Fisheries Research*, **108** (1): 142-152.
- DIEUZEIDE R., NOVELLA M., ROLAND J., 1953 - Catalogue des poissons des côtes algériennes, Volume I. Squalés – Raies – Chimères. *Bulletin de la Station d'Aquiculture et de Pêche de Castiglione*, nouvelle série **6**, volume I: 1-274.
- DULVY N., WALLS R., 2015 - *Leucoraja melitensis*. The IUCN Red list of Threatened Species 2015: e.T61405A48954483.- Downloaded on 28 March 2018.
- ENNAJAR S., 2002. - *Contribution à l'étude écobioologique des élasmobranches hypotrèmes de la région du golfe de Gabès*. Dissertation, University of Sfax, Tunisia, 201 pp.
- FERRETTI, F., OSIO G.C., JENKINS C.J., ROSENBERG, A.A., LOTZE H.K., 2013 - Long-term change in a meso-predator community in response to prolonged and heterogeneous human impact. *Science. Reports* **3**, 1057; DOI:10.1038/srep01057 (2013).
- LAST P., NAYLOR G., SÉRET B., WHITE W., STEHMANN M., de Carvalho M., 2016 - *Rays of the world*. Csiro Publishing, 800 pp.

- MCEACHRAN J.D., DUNN K.A., 1998 - Phylogenetic analysis of skates, a morphologically conservative clade of elasmobranchs (Chondrichthyes: Rajidae). *Copeia*, **2**: 271-290.
- MNASRI N., 2008 - *Les élasmodontes de la Tunisie septentrionale: biodiversité et méthode d'approche de la production débarquée*. Dissertation, University of Carthage, Tunisia, 125 pp.
- MNASRI N., BOUMAÏZA M., CAPAPÉ C., 2009 - Morphological data, observations and occurrence of a rare skate, *Leucoraja circularis* (Chondrichthyes: Rajidae), off the northern coast of Tunisia (central Mediterranean). *Pan-American Journal of Aquatic Sciences*, **4** (1): 70-78.
- MNASRI N., EL KAMEL O., BOUMAÏZA M., BEN AMOR M.M., REYNAUD C., CAPAPÉ C. 2010 - Morphological abnormalities in two batoid species (Chondrichthyes) from northern Tunisian waters (central Mediterranean). *Annales, Series Historia naturalis*, **20** (2): 181-190.
- ORLOV A.M., 2010 - Record of a tailless Richardson's ray *Bathyraja richardsoni* (Garick, 1961) (Rajiformes: Arhynchobatidae) caught off the Mid-Atlantic ridge. *Pan-American Journal of Aquatic Sciences*, **6** (3): 232-236.
- PORCU C., MARONGIU M.F., BELLODI A., CANNAS R., CAU A., MELIS R., MULASA, SOLDOVILLA G., VACCA L., FOLLESA M.C., 2017 - Morphological descriptions of the egg cases of skates (Rajidae) from the central-western Mediterranean, with notes on their distribution. *Helgoland Marine Research*, **7** (1): 10. doi: 10.1186/s10152-017-0490-2.
- RELINI G., MANNINI A., DE RANIERI S., BITETTO I., FOLLESA M.C., GANCITANO V., MANFREDI C., CASCIARO I., SION I., 2010 - Chondrichthyes caught during the MditS survey in Italian waters. *Biologia Marina Mediterranea*, **17** (1): 186-204.
- RIBEIRO-PRADO C.C., ODDONE M.C., BUENO GONZALEZ M.M., FERREIRA DE AMORIM A., CAPAPÉ C., 2008 - Morphological abnormalities in skates and rays (Chondrichthyes) from off Southeastern Brazil. *Arquivos de Ciencias do Mar, Fortaleza* **41** (2): 21-28.
- SERENA F., 2005 - *Field Identification Guide to the sharks and rays of the Mediterranean and Black Sea*. FAO species Identification Guide for Fisheries Purposes. FAO: Rome, 97 pp.
- SERENA F., MANCUSI C., BARONE M., 2010 - Field identification guide to the skates (Rajidae) of the Mediterranean Sea. Guidelines for data collection and analysis. *Biologia Marina Mediterranea* **17** (Suppl. 2): 204 pp.
- STEHMANN M., BÜRKEL D.L., 1984 - Rajidae. In: Fishes of the north-eastern Atlantic and the Mediterranean. Whitehead P.J.P., M.-L. Bauchot, J.-C. Hureau, J. Nielsen and E. Tortonese, (eds.), Paris, UNESCO pp. 163-196.
- TORCHIO M., 1961 - Rinvenimento del primo maschio di *Raja melitensis* Clark. *Natura*, Milano, **51** (2): 65-69.
- TORTONESE E. 1956 - *Leptocardia, Ciclostomata, Selachii*. Fauna d'Italia. Calderini, Bologna, 334 pp.